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Executive Summary

Pursuant to recommendations offered at the conclusion of Phase I of a comprehensive Industrial Hygiene indoor air quality evaluation of the DOB and DOX buildings at 120 S. Spring Street, Los Angeles, CA , this portion of Phase II (Phase II A) was performed. It included air sampling for total particulate and five metals (zinc, lead, cadmium, nickel and chromium), analysis of dust samples from HVAC registers/ducts for the five metals and particulate characterization, and repeat measurements of temperature, relative humidity and carbon dioxide.

The air sampling results for total particulate were substantially below the Cal/OSHA PELs and ACGIH TLVs for both total and respirable particulate. The range of indoor total particulate air concentrations was within the range of the outdoor concentrations.

The air sampling results for all of the metals were below their respective limits of detection, which were substantially below their respective PELs and TLVs.

The dust samples from the HVAC registers/ducts were determined to have zinc as the most prevalent metal component, with lead a distant second. The other metals were present in much lower concentrations. The particulate characterizations revealed that the dominant particulates were corrosion products, dander and cellulose.

The air sample results demonstrated the absence of recognized health hazards from airborne particulates. However, the dust sample results demonstrated that when "falling dust" episodes occur there could be a potential for ingestion exposure. To minimize this risk a "falling dust" incident response protocol has been established.

The carbon dioxide (CO_2) measurements were all below 1,000 ppm, which is a currently accepted guideline for indoor air quality.

The temperature and relative humidity measurements generally were within ASHRAE guidelines. Over-all the temperature variations in the DOX building were lower than in the DOB building. A recommendation is made to review the feasibility and cost-effectiveness of improving the temperature controls in DOB for the anticipated duration of Caltrans' future occupancy.

Phase II B will be completed upon receipt of authority to proceed.

1.0 BACKGROUND

1.1 This phase (Phase II A) of a comprehensive Industrial Hygiene indoor air quality evaluation of Caltrans' two buildings at 120 South Spring Street, Los Angeles, CA was conducted pursuant to recommendations included in the Phase I report submitted on July 25, 2002 (reference HSA project no. 22A0256).

1.2 The Phase II A work was performed during October 7 - 21, 2002. It included:

- Air sampling for total particulate and five metals (zinc, lead, cadmium, nickel and chromium). Eight locations on each of 10 floors and one outdoor location.
- Analysis of dust samples at various locations from HVAC ducts/registers for the five metals noted above and microspical particulate characterization.
- Temperature, relative humidity and carbon dioxide measurements. Twelve locations on each of 10 floors and one outdoor location.

2.0 AIR SAMPLING FOR TOTAL PARTICULATE AND METALS.

2.1 The air samples were collected nominally for a duration of 7 to 8 hours to be representative of employee exposures during regular occupancy. The sampling locations were selected so that there would be two samples per quadrant on each floor. On each day of sampling a concurrent outdoor sample was collected for comparative purposes.

2.2 The air samples for total particulate and metals were collected on the dates and at the locations noted below.

October 7, 2002	Basement DOB
October 8, 2002	First Floor DOB
October 9, 2002	Second Floor DOB
October 10, 2002	Third Floor DOB
October 11, 2002	Fourth Floor DOB
October 15, 2002	Fifth Floor DOB
October 16, 2002	First Floor DOX
October 17, 2002	Second Floor DOX
October 18, 2002	Third Floor DOX
October 21, 2002	Fourth Floor DOX

2.3 The air samples were collected on tare weighed PVC filters housed in 37 mm plastic cassettes. The cassettes were connected via tubing to portable battery operated sampling pumps. The flow rate for each sample was set nominally at 2.0 liters per minute (lpm) using a field rotameter. The rotameter was calibrated in the laboratory using the frictionless piston method, a primary standard. The flow rate for each sample was checked at the beginning, periodically during, and at the conclusion of sampling.

2.4 The air samples were analyzed in HSA's industrial hygiene and environmental laboratory. Total particulate was determined gravimetrically in accordance with the NIOSH 0500 method. Analysis for the metals was by inductively coupled argon plasma (ICAP) in accordance with the NIOSH 7300 method. HSA's laboratory maintains accreditations by the American Industrial Hygiene Association (AIHA), the California Department of Health Services (DHS), and the National Institute of Standards and Technology (NIST).

2.5 The results of the air samples are reported on Table I (see Tab No. 1). The locations of the samples are depicted on the floor plans in Tab No. 2.

2.6 The total particulate results all were substantially below the Cal/OSHA permissible exposure limits (PELs) of 10 mg/m^3 for total particulate and 5 mg/m^3 for respirable particulate. They also were well below the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs) of 10 mg/m^3 for total particulate and 3 mg/m^3 for respirable particulate. The PELs and TLVs are expressed as 8-hour time weighted averages (TWAs).

2.7 Sixty-four of the 80 indoor air samples were below the limit of detection (less than 0.05 to less than 0.07 mg/m^3) for total particulates. The ten outdoor air samples ranged from below the limit of detection to 0.60 mg/m^3. The remaining 16 indoor air samples ranged from 0.05 to 0.38 mg/m^3.

2.8 The metals results for all of the air samples (indoors and outdoors) were below their respective limits of detection and, thereby, were well below the respective PELs and TLVs for cadmium, chromium, lead, nickel and zinc.

2.9 The total particulate and metals lab reports with chain of custody are located behind Tab No. 3.

3.0 DUST SAMPLES.

3.1 Historically, there have been episodes of black dust from the HVAC registers and/or ducts "falling" onto desk tops and other surfaces. Therefore, during the ten days of air sampling, samples of opportunity were collected to characterize the nature of this black dust.

3.2 These dust samples were analyzed in HSA's laboratory for cadmium, chromium, nickel, zinc and lead by ICAP pursuant to EPA methods no. 3050 and 6010. They were also analyzed microspically to characterize the particle composition of the dust. These lab reports with chain of custody are located behind Tab No. 4.

3.3 The results of the dust sample analyses are reported on Table II (see Tab No. 1). With respect to the microscopical characterizations, only the dominant particulate is reported on the table. Refer to the lab reports behind Tab No. 4 for the complete results.

3.4 The results of the metal analyses indicate that zinc was by far the most dominant metal in the dust samples. This is most likely due to the fact that the HVAC ducts and other components are composed of galvanized metal. It is logical that the particulates from metal corrosion would be high in zinc content.

3.5 The next most prevalent metal was lead. The most likely sources of this metal are long-term accumulation of environmental lead and the presence of small amounts of lead in the galvanic coatings of the galvanized metal components of the HVAC systems.

3.6 Cadmium, chromium and nickel were present in substantially lesser quantities.

3.7 The microspical characterizations revealed the dominant presence of of corrosion products and products related to human activity (such as dander and cellulose). The presence of black dust in quantities sufficient to take bulk samples and the types of particulates identified as dominant are evidence of past poor maintenance. We are aware of significant improvements in HVAC maintenance over the past one to two years. However, these improvements cannot, in themselves, remove the accumulation of many years.

3.8 Despite the presence of one or more of the five metals in all of the dust samples, no metals were detected in any of the air samples. Thereby, the main concern for potential exposure is the presence of the black dust in work areas when there is an incident of dust falling from an HVAC register/duct. This circumstance is more likely to present an ingestion potential. Therefore, to minimize this potential implementation of a response protocol would be prudent.

3.9 Prior to and during the course of this Phase II A work, the advisability of establishing a "falling dust" response protocol was discussed with Mr. Faubush. This protocol has been put in place. The elements of this protocol are listed below.

EMERGENCY DUCT AND DIFFUSER CLEANING PROCEDURES

- Evaluate which mixing boxes serve the area of complaint/incident.
- Remove the Air Handler from service that serves the area. Lock Out/Tag Out.
- Remove the supply ducts from the mixing boxes.
- Clean the supply ducts at the mixing boxes with a HEPA vacuum.
- Clean the inside of the mixing boxes with a HEPA vacuum.
- Re-attach the supply ducts to the mixing boxes.
- Clean the diffusers with a HEPA vacuum.
- Clean the diffusers with sanitary wipes.
- Install filters at the diffusers if necessary.
- Assist Janitorial with area clean up.
- Return Air Handler to service.

EMERGENCY AREA CLEANING PROCEDURES

- Evaluate area to be cleaned.
- Wipe off the top of the partitions, cabinets, etc. with damp cheese cloth.
- Wipe desks and other furniture in the area with a HEPA vacuum.
- Vacuum chairs and other fixtures with cheese cloth.
- Vacuum the floor in the area with a HEPA vacuum.

This protocol appears to be a reasonable approach, given the relatively short-term expected continued occupancy of the buildings by Caltrans (approximately two years).

4.0 TEMPERATURE, HUMIDITY AND CARBON DIOXIDE MEASUREMENTS

4.1 Measurements for temperature, relative humidity and carbon dioxide were taken on the dates and at the locations noted below.

October 7, 2002	Basement DOB
October 8, 2002	First Floor DOB
October 9, 2002	Second Floor DOB
October 10, 2002	Third Floor DOB
October 11, 2002	Fourth Floor DOB
October 15, 2002	Fifth Floor DOB
October 16, 2002	First Floor DOX
October 17, 2002	Second Floor DOX
October 18, 2002	Third Floor DOX
October 21, 2002	Fourth Floor DOX